U.S. Department of the Interior U.S. Geological Survey

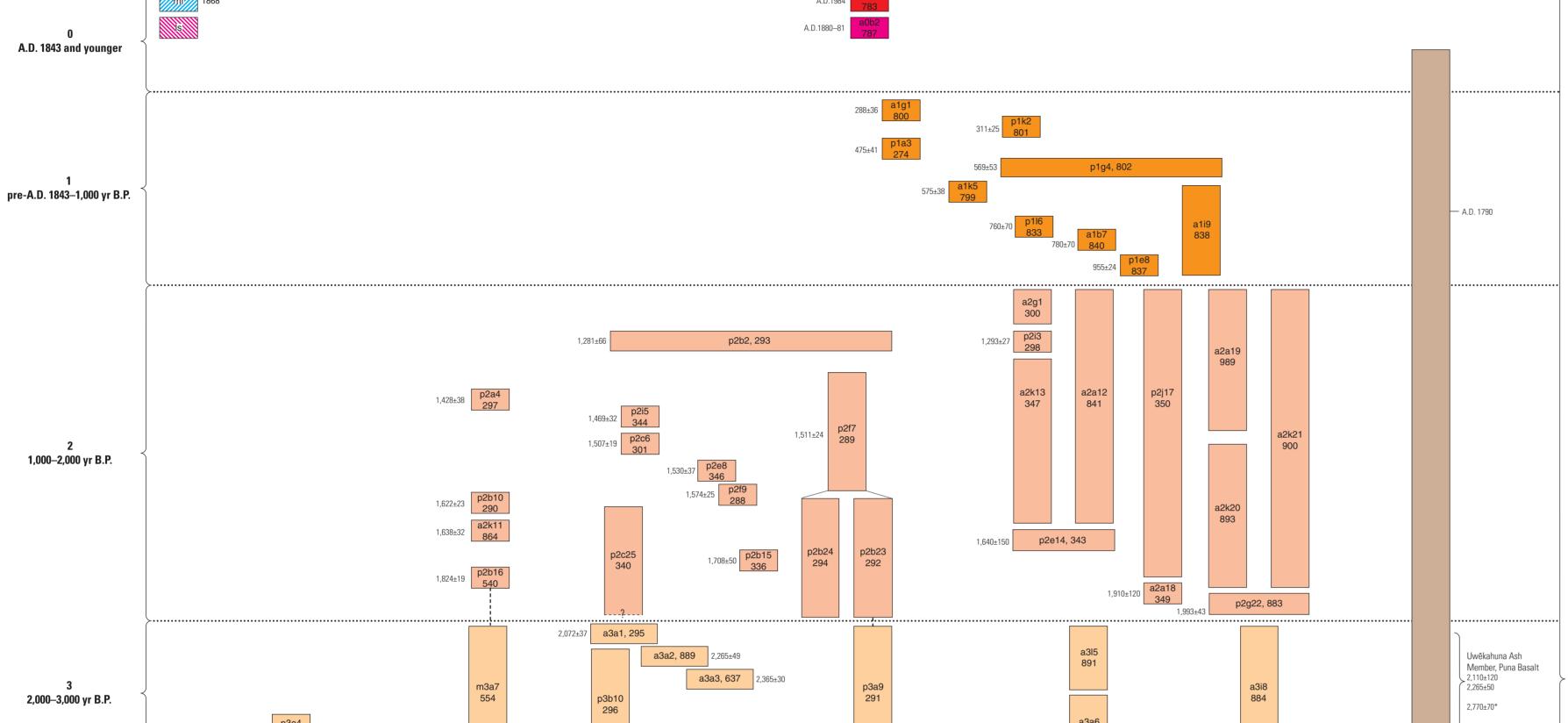
15,000-20,000 yr B.P.

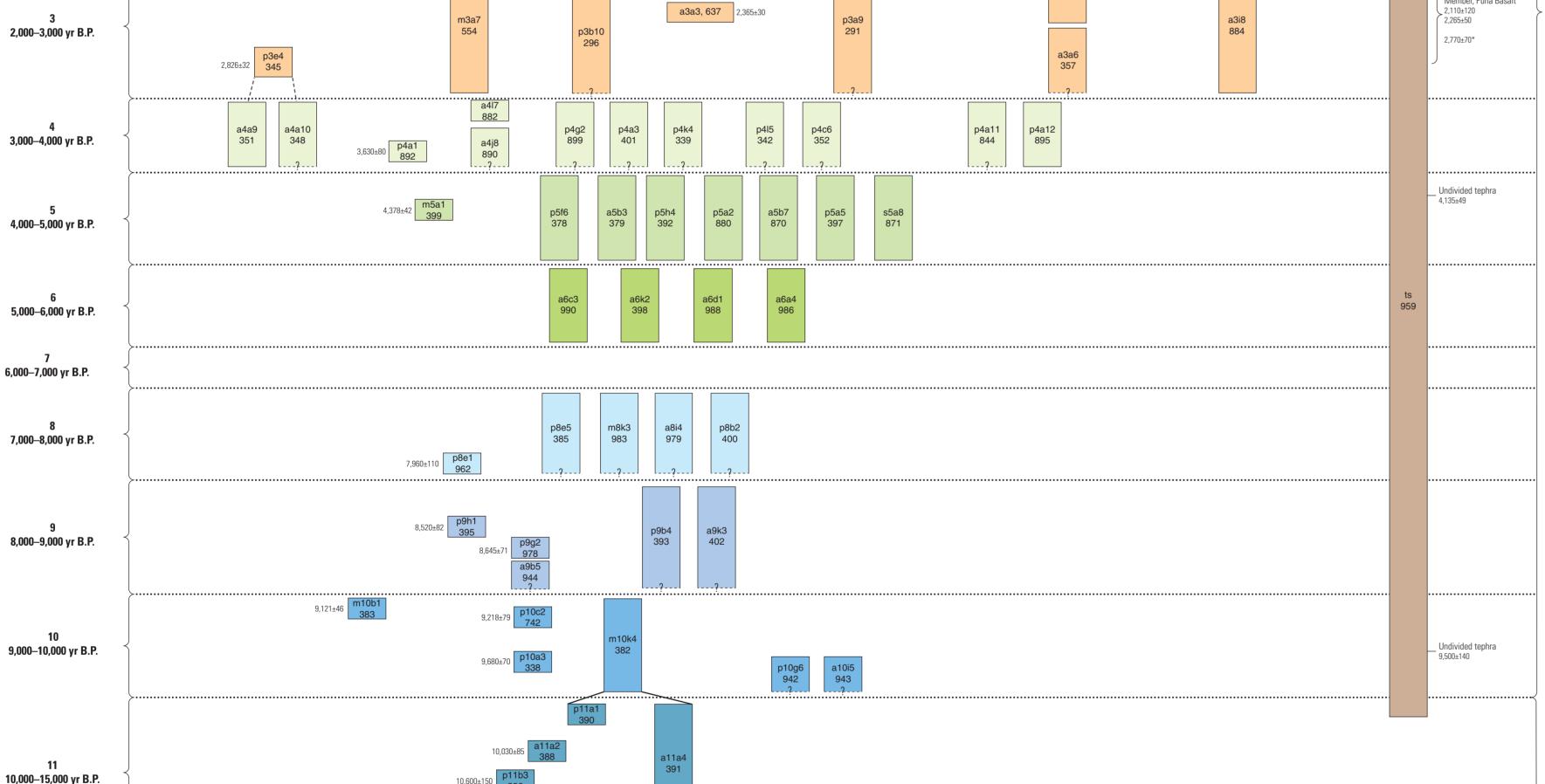
20,000-30,000 yr B.P.

30,000-100,000 yr B.P.

>100,000 yr B.P.

CORRELATION OF MAP UNITS [Only the unit label for the most common flow type, listed first in the unit description (Description of Map Units and table 2. See Description of Map Units for detailed unit age information. Uncalibrated radiocarbon ages are reported in years before present (yr B.P.). Undated flows are correlated with dated flows using superposition; surface exposure; color change due to solar radiation; extent of weathering; tree height, size, and girth; diversity of native plant species; and soil and ash accumulation. Equivalence of horizontal position of undated flows does not imply age equivalence and, vertical positioning of one unit over another applies only to the stratigraphic relations of the units that are superimposed (such as a417 and a4j8 or p3e4 and a4a9 and a4a10) in the correlation diagram. Queried dashed line at bottom of unit box shows base of flow is concealed. In addition to the map unit label, a unique, three-digit flow identification number (FID; for example, FID 831) is assigned to each mapped flow unit to facilitate use of the database (https://doi.org/10.3133/2932B); the FID is essential as a unique descriptor for unit identification in the database. FID numbers are included for the units shown] SEDIMENTARY DEPOSITS VOLCANIC DEPOSITS DISTAL TEPHRA DEPOSITS LAVA FLOWS AND VENT DEPOSITS Ka'ū Basalts





Kahuku Basalt

Nīnole Basalt

* Uwēkahuna Ash Member of the Puna Basalt: Two episodes between 2,110±120 and 2,770±70 (Dzurisin and

LIST OF MAP UNITS

[Some unit exposures on the printed or plotted map are not labeled to avoid obscuring data; use unit color or database (https://doi.org/10.3133/2932B) for unit identification. The simplified map unit label is not unique and provides quick access to flow morphology, flow age group, phenocryst mineralogy, and flow number in an age group (table 3, sheet 1); this non-unique unit label may be used for an entirely different unit on a different flank of Mauna Loa. We use the term "phenocryst" for any mineral ≥1 mm in maximum diameter. Pyroxene is not an abundant phenocryst in Mauna Loa lava flows; therefore, it is not included in phenocryst mineralogy. In addition to the map unit label, a unique, three-digit flow identification number (FID; for example, FID 831) is assigned to each mapped flow unit to facilitate use of the database for the entire Mauna Loa edifice; the FID is essential as

a unique descriptor for unit identification in the database] SEDIMENTARY DEPOSITS Mudflow deposits of A.D. 1868 (Holocene) Landslide deposits (Holocene)

VOLCANIC DEPOSITS LAVA FLOWS AND VENT DEPOSITS Kaʻū Basalt

Age Group 0 (A.D. 1843 and younger; Holocene)

A.D. 1984 flow—FID 783 A.D. 1880-81 flow-FID 787 Age Group 1 (pre-A.D. 1843–1,000 yr B.P.; Holocene) Keʻāmuku Kīpukakēkake flow—FID 800

Kīpukamauna'iu flow—FID 801 p1k2, a1k2, m1k2 Ke A Po'omoku Lava Flow—FID 274 p1a3, a1a3, m1a3 Keʻāmuku Kīpukakulalio flow—FID 802 Keʻāmuku Kīpukakulalio east flow—FID 799 a1k5, p1k5, m1k5 Keauhou Ranch flow—FID 833 p1l6, a1l6 Flow northeast of A.D. 1880 lobe—FID 840 a1b7, p1b7 Pu'uwahi picrite flow—FID 837 p1e8, a1e8

Keʻāmuku Kīpukakulalio west flow—FID 838 Age Group 2 (1,000–2,000 yr B.P.; Holocene)

Flow 300—FID 300 West Wood Valley flow—FID 293 Pahuamimi flow—FID 298 p2i3 a2i3, m2i3 Keakapulu Flat flow—FID 297 p2i5, a2i5 Kapāpala flow—FID 344 Kilohana flow—FID 301

Waimuku flow—FID 289 Pu'u'ele'ele flow—FID 346 p2e8, a2e8, m2e8 Ka'ala'ala Gulch flow—FID 288 Kapāpala Ranch flow—FID 290

Upper Waiākea flow—FID 864 Flow 841—FID 841 a2a12, p2a12 Nāpu'ukūlua flow—FID 347 a2k13, p2k13 Kauhiuhi flow—FID 343 p2e14, a2e14 East Wood Valley flow—FID 336

Flow 350—FID 350 p2j17, a2j17 Kauhiuhi Maluikeao flow—FID 349 a2a18, p2a18, m2a18 Flow 989—FID 989 a2a19, p2a19 Kīpukalō'ihi flow—FID 893 Flow 900—FID 900 a2k21, p2k21

Moa'ula flow—FID 540

Age Group 3 (2,000–3,000 yr B.P.; Holocene)

p2g22, a2g22 Upper Strip Road flow—FID 883 Pi'ikea flow—FID 292 p2b23 Keaīwa Gulch flow—FID 294 Flow 340—FID 340

Red Cone flow—FID 295 Eastern Ka'ōiki Pali flow—FID 889 a3a2, p3a2 Nīnole flow—FID 637 a3i3 Cow Pasture picrite flow—FID 345 Flow 891—FID 891 a3l5, p3l5 Flow 357—FID 357 'Alili flow—FID 554 Flow 884—FID 884 a3i8, p3i8, m3i8

Ka'ala'ala flow—FID 291 Flow 296—FID 296 p3b10 Age Group 4 (3,000–4,000 yr B.P.; Holocene) 'Ōhaikea flow—FID 892 Flow 899—FID 899 p4g2, a4g2

p4a3, a4a3

Flow 401—FID 401

Flow 895—FID 895

Flow 339—FID 339 Wai'akaloa Gulch flow—FID 342 p4l5 Flow 352—FID 352 a4l7 Flow 882—FID 882 Flow 890—FID 890 Flow 351—FID 351 a4a9, p4a9 Flow 844—FID 844 p4a11, m4a11

Age Group 5 (4,000–5,000 yr B.P.; Holocene) Halfway House flow—FID 399 Flow 880—FID 880 p5a2, m5a2 'Ahulili flow—FID 379

Age Group 5 (4,000–5,000 yr B.P.; Holocene)—Continued Flow 392—FID 392 Ka'ili'ula flow—FID 397 p5a5 Uewale Gulch flow—FID 378 Kīpukakēkake flow—FID 870 a5b7, p5b7, m5b7 Pu'ukīpū cone—FID 871 Age Group 6 (5,000–6,000 yr B.P.; Holocene) Flow 988—FID 988 Kīpukapakēkakē flow—FID 398

Flow 990—FID 990 Pu'u 4274 flow—FID 986 Age Group 7 (6,000–7,000 yr B.P.; Pleistocene) [No units of this age group are found at the surface in the map area]

> Palakea Flat flow—FID 962 p8e1 Flow 400—FID 400 p8b2, a8b2 Flow 983—FID 983 m8k3,p8k3 Flow 979—FID 979 a8i4, p8i4 'Ua'u flow—FID 385 p8e5

> > Age Group 9 (8,000–9,000 yr B.P.; Holocene)

Age Group 8 (7,000–8,000 yr B.P.; Holocene)

Halfway House Kīpuka flow—FID 395 p9h1 Pu'u'ula'ula flow—FID 978 p9g2, a9g2 a9k3 Flow 402—FID 402 Flow 393—FID 393 p9b4 Flow 944—FID 944 a9b5, p9b6

Age Group 10 (9,000–10,000 yr B.P.; Holocene)

m10b1, p10b1, a10b1 Ka'ū High School flow—FID 383 Lae'opuhili flow—FID 742 p10c2 Flow 338—FID 338 p10a3 'Iliokoloa flow—FID 382 m10k4, p10k4, a10k4 Flow 943—FID 943 a10i5 Flow 942—FID 942 p10g6

Age Group 11 (10,000–15,000 yr B.P.; Holocene and Pleistocene)

Kauhuhu'ula flow—FID 390 a11a2, p11a2 Pā'au'au flow—FID 388 Meyer Camp flow—FID 386 p11b3 Wailoa flow—FID 391 a11a4

Age Group 12 (15,000–20,000 yr B.P.; Pleistocene) [No units of this age group are found at the surface in the map area]

Age Group 13 (20,000–30,000 yr B.P.; Pleistocene)

Flow 387—FID 387 m13b1 Flow 384—FID 384 a13b2 Lava flow of Hi'onamoa Gulch—FID 735 a13f3, p13f3 Kahuku Basalt

> Age Group 14 (30,000–100,000 yr B.P.; Pleistocene) [No units of this age group are found at the surface in the map area]

> > *Age Group 15 (>100,000 yr B.P.; Pleistocene)*

Nīnole Basalt—FID 744 DISTAL TEPHRA DEPOSITS Southern tephra—FID 959 Pāhala Ash—FID 389

> **EXPLANATION OF MAP SYMBOLS Contact**—Approximately located. Internal contact defines

Fault—Ball and bar on downthrown block. Dotted where concealed Fissure—Trace of fissure $\approx \approx \approx \approx \approx$ Ground-crack zone 'A'ā and mixed flows

Ash—Ash (unit ts) covering flows Kīlauea Volcano deposits—Exposed in southern part of Radiocarbon-dated sample locality—Age shown in yr B.P. See table 2 (pamphlet) for analytical data; note that not all age localities are in map area Sample from surface flow—Charcoal Sample from measured section—Does not date surface



Photograph showing a view of the youngest prehistoric flows from Mauna Loa in Kilauea Crater quadrangle. Flow in the foreground is Keʻāmuku Kīpukakulalio east flow (575 yr B.P.; FID 799); the forested region within the flow is vegetation that survived a forest fire. Right center, the region with the tall trees is unit ts or undifferentiated ash (FID 959). Left center, the flow with minimal trees, is the Keʻāmuku Kīpukakēkake flow (288 yr B.P.; a1g1, FID 800). The mosaic of native vegetation types are an indirect indicator of substrate age. Photograph by Frank A. Trusdell, U.S. Geological Survey.



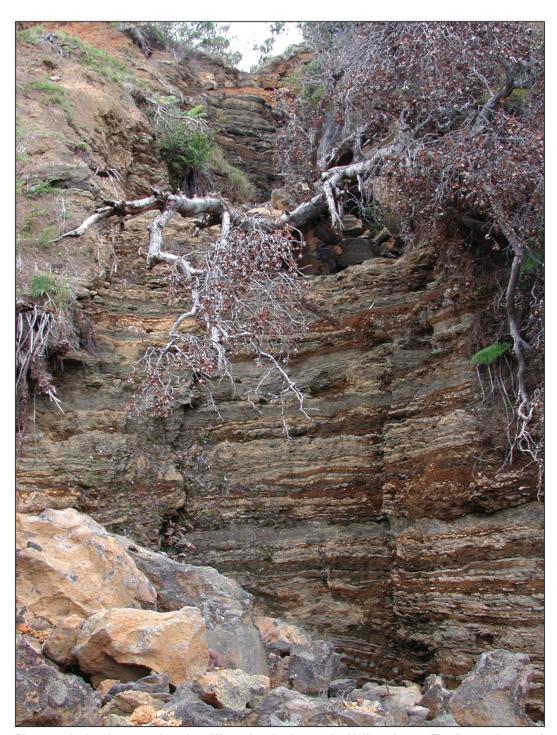
Photograph showing an upslope view of the A.D.1880–81 flow that originates from about 10,500 ft elevation. The different flow colors and the different vegetation provide geologists with clues of changing substrates (flows) with different ages. Photograph by Frank A. Trusdell, U.S. Geological



Photograph showing pasture land in the foreground that is composed of several lava flows mantled by undifferentiated ash (unit ts). The drainages carved into the ash also provide clues as to the age of the flows. The sharp boundary between the pasture and the forest is due to land use. The pasture consists of land used for cattle; the forest beyond is Hawai'i Volcanoes National Park. At one time the National Park land looked like the pasture; but, the forest returned after the cattle were removed. Photograph by Frank A. Trusdell, U.S. Geological Survey.



represent regions where undifferentiated ash (unit ts) mantles older lava flows. The young lava flows bisecting and surrounding the green grassy kīpuka all originate from the NERZ. In the background is the Pu'ukīpū flow (left) and the Kūlani (right) cones. Photograph by Michael H. Zoeller, U.S. Geological Survey.



Photograph showing a section of undifferentiated ash near the Halfway house. The flow at the top of the section is the Halfway House Kīpuka flow dated at 8,520 yr B.P. Photograph by Frank A. Trusdell,

Geologic Map of the Central-Southeast Flank of Mauna Loa Volcano, Island of Hawai'i, Hawaii

— Pāhala Ash

31,020±310

https://doi.org/10.3133/sim2932B.